| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 09/848,826 | 05/04/2001 | Eran Gabber | Gabber 17-1-10-1 | 7476 |

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| EXAMINER |
|---|
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| ART UNIT | PAPER NUMBER |
|---|---|
| 2187 | |

DATE MAILED: 06/16/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

| | Application No. | Applicant(s) |
|---|---|---|
| **Office Action Summary** | 09/848,826 | GABBER ET AL. |
| | Examiner | Art Unit |
| | NGOC V DINH | 2187 |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>03</u> MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on */05/04/01*.

2a)☐ This action is **FINAL**.     2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-55* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-22,27,28,48,51 and 54* is/are rejected.

7)☒ Claim(s) *23-26,29-47,49-50,52-53 and 55* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All   b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
    Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____.

5)☐ Notice of Informal Patent Application (PTO-152)

6)☐ Other: _____.

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis

for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

1. Claims 1-10, 13-14, 18, 20, 27, 56-57 are rejected under 35 U.S.C.102 (e) as being anticipated

by Shah et al. [US 2003/0009538].

**Per claim 1,** Shah teaches a file system for a client computer system [fig. 1] which comprises

main memory and at least one secondary storage device [fig. 8], where said file system [805, fig.

8] is programmed to receive and service file requests, to control accesses (including reads and

writes) to a main memory [col. 6, [0135]], to group files together in clusters [e.g., access patterns

can be collected into profile, col. 15 [0274]] and to store and retrieve clusters from said at least

one secondary storage device, and where said file system comprises file system clustering logic

which assists in said grouping of files together in clusters by grouping together files likely to be

requested from said file system in close temporal proximity [col. 15, [0274]].

**Per claims 2 and 4,** Inherently Shah teaches a library of functions provided to applications by

said file system, a function which takes as arguments at least two file names, which, when called,

indicates to said file system clustering logic that said at least two file names provided as

arguments should be stored together [e.g., these access patterns can be collected into profiles ...

to pre-package groups of application file pages, col. 15 [0274] in one cluster if possible; as part

of a library of functions provided to applications by said file system, a collocation function

which takes as arguments at least two file names, which, when called, indicates to said file

system clustering logic that the files named by the file names provided as arguments should be

stored together in one cluster if possible. This is because in order to collect files with same

pattern [temporal proximity] into a profile, the file system must have a process/program

[function/procedure] or subroutine [collocation function], which when being called [executed]

will take files as input arguments, compare and identify files with same pattern [temporal

proximity] and group them all together into a profile.

**Per claim 3,** Shah teaches file system clustering logic examines historical calls [e.g., access patterns, temporal locality, col. 15, [0274]] to files in order to determine which files are likely to be requested from said file system in tandem or close temporal proximity.

**Per claims 5 and 7,** Shah teaches a caching proxy system comprising a computer system utilizing the file system, and programmed to receive and serve requests for data from a large distributed-data network; large distributed-data network is the World Wide Web [fig. 34, 36; col. 3 [0062-0064]; col. 8, [0166]; col. 13 [0230]].

**Per claim 6,** inherently Shah teaches computer system is programmed to utilize said collocation function to provide an indication to said file system that the files named by the file names provided as arguments should be stored together in one cluster if possible. This is because in order to collect files with same pattern [temporal proximity] into a profile, the file system must have a process/program [function/procedure] or subroutine [collocation function], which when being called [executed] will take files as input arguments, compare and identify files with same pattern [temporal proximity] and group them all together into a profile.

**Per claim 8,** Shah teaches file system is further programmed to maintain and update meta-data [col. 18, [0316]], including file system meta-data [col. 20, [0358]] stored in said main memory regarding said file system's usage of said main memory; file meta-data information regarding files stored in said main memory which have not yet been grouped into a cluster [e.g., the initialization data set is the first set of data to be streamed, col. 18 [0315]]; and cluster meta-data regarding clusters stored in one of said at least one secondary storage device [e.g., this data is merged into the existing AppInstallBlock, col. 18, [0315]], [col. 18, [0310-0314]].

**Per claim 9,** Shah teaches file meta-data comprises a hash table and file information including a file number, file location in main memory or in a cluster, the status of the file, and a reference count of the number of users currently reading the file [col. 22, [0424-0435].

**Per claim 10,** Shah teaches maintenance and updating of file meta-data comprises the steps of computing a hash for the file name of each file being accessed and updating the file meta-data for the file at the corresponding entry in said hash table [col. 12, [0218-0221]], or, if the corresponding entry does not match said file name, updating the file meta-data [col. 12, [0222]] for the next consecutive entry in said hash table [col. 22, [0424-0440]].

**Per claim 13,** Shah teaches file system is further programmed to access said file meta-data to determine the location of a file being requested [col. 4, [0084]; col. 18, [0316]].

**Per claim 14,** Shah teaches cluster meta-data information comprises for each cluster stored on said at least one secondary storage device, information about the status (empty, on disk, in memory, uncacheable) of the cluster, information about the last time the cluster was accessed, and a linked list of files [e.g., REG_LINK, col. 24, [0514]] in the cluster [col. 18, [0316]; col. 22, [0425-0426]; col. 22, [0438-0452]].

**Per claim 18,** Shah teaches the size of said clusters is selected using information about the size of files stored together in clusters [col. 21, [0410], concatenation application file; [0411]; col. 23, [o471], [0477]].

**Per claim 20,** Shah teaches a library of functions provided to applications by said file system, comprising a write function [e.g., writeback function in cache system] which, when called, writes a given file directly to said at least one secondary storage device [col. 6, [0135]].

**Per claim 27,** Shah teaches file system further comprises a daemon which groups files together in clusters and stores clusters to said at least one secondary storage device [fig. 21].

**Per claims 56-57,** Shah teaches said file system is further programmed to precompute checksums for a transmission protocol for stored files and to send the precomputed checksum when the files are accessed [0217];

The file system where the transmission protocol is the Transmission Control Protocol (TCP) [0366].

## Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2.  Claims 11-12 are rejected under 35 U.S.C 103(a) as being unpatentable over Shah, and in view of Yang et al PN 5,754,888.

**Per claims 11-12,** Shah teaches the claimed limitations as noted above.

Shah does not teach the file system is further programmed to, upon loss of meta-data, scan said
at least one secondary storage device after recovery and rebuild said meta-data.

Yang teaches the file system is further programmed to, upon loss of meta-data, scan said at least
one secondary storage device after recovery and rebuild said meta-data [col. 4, lines 1-15; crash
recovery, col. 9-10].

It would have been obvious to one having ordinary skill in the art at the time the invention was
made to further include Yang 's teaching, as mentioned above, into Shah file system in order to
increase the system reliability since data is always backup to the second storage device.


3. Claims 15-17 and 19 are rejected under 35 U.S.C 103(a) as being unpatentable over Shah, and
in view of Lo et al PN 5,138,705.

**Per claims 15-16 and 19,** Shah teaches the claimed limitations as noted above.

Shah does not teach size of said clusters does not vary; size of said clusters varies; size of said
clusters are based on powers of two.

Lo teaches size of memory is varied, not varied [fixed size], and based on power of two [col. 9,
line 65 to col. 10 line 10].

It would have been obvious to one having ordinary skill in the art at the time the invention was
made to further include Lo's teaching, as mentioned above, into Shah file system. Doing so
would allow a fixed-size memory has its lateral dimension decreased and its length
increased, when the memory is extended in order to accommodate a change in the internal shape
of the page frames in the memory [col. 4, lines 35-45].

**Per claim 17,** Shah teaches the size of said clusters is selected from a finite subset of possible
cluster sizes [fig. 16; col. 12, [0213], each memory 1602 contains subset of pages 1,2,3].


4. Claims 21-22 are rejected under 35 U.S.C 103(a) as being unpatentable over Shah, and in
view of Dye et al PN 6,523,102.

**Per claim 21,** Shah teaches the claimed limitations as noted above.

Shah does not teach write function, when called, removes the given file from memory.

Dye teaches write function [e.g., writeback], when called, removes the given file from memory
[col. 87, lines 25-30].

It would have been obvious to one having ordinary skill in the art at the time the invention was made to further include Dye's teaching, as mentioned above, into Shah file system in order to maintain data/files coherency between caches web in the network. This is because when a file is modified in a cache web, other processors will snoop the data bus in order to keep the file in their controller's cache web the same as that modified file. If the snoop result is that the cache line is not maintained locally or the cache line has not been modified, processor interface forwards the flush request to memory directory interface unit associated with home memory of

the cache line. The local processors having an unmodified copy of the cache line may be flushed of the cache line at this point. Memory directory interface unit determines which processors in system maintain a copy of the cache line. The flush request is then forwarded to the identified processors for appropriate action. If an identified processor has a modified copy of the cache line, it removes the modified copy from its cache and forwards the modified copy in a writeback request to memory directory interface unit for memory update. Therefore files coherency in the network is maintained.

**Per claim 22,** Shah does not teach writing of a given file directly to said at least one secondary storage device is delayed until more space is needed in said main memory.

Dye teaches write function [e.g., writeback] which write data to at least one secondary storage device is delayed until more space is needed in said main memory [col. 32, lines 33-38; col. 37, lines 30-65].

It would have been obvious to one having ordinary skill in the art at the time the invention was made to further include Dye's teaching, as mentioned above, into Shah file system. Doing so would maintain the data/file coherency [synchronized data] between caches in the system [col. 28, lines 1-40]


5. Claim 28 is rejected under 35 U.S.C 103(a) as being unpatentable over Shah et al.

**Per claim 28,** Shah teaches the claimed limitations as noted above.

Shah does not teach the operations of said daemon occur when more space is needed in said main memory.

However, it would have been obvious to one having ordinary skill in the art at the time the invention was made to carry out the operations of daemon occur when more space is needed in

the main memory, because when the main memory is in need of space for storage, then the file system must call the grouping function in the daemon for clustering files together. By clustering files together, the main memory would be defragmented and this allows many small fragmented areas of main memory to be relocated to make a larger working space.

6. Claims 48, 51 and 54 are rejected under 35 U.S.C 103(a) as being unpatentable over Shah, and in view of Shoroff et al PN 5, 983,240.

Shah teaches the claimed limitations as noted above.

**Per claims 48 and 51,** Shah does not teach file system is further programmed to log deletions of files and clusters in a delete log which is stored on one of said at least one secondary storage device, and logging of deletions occurs when requested.

Shoroff teaches a file system [File Allocation Table (FAT); col. 1, lines 23-40] to log deletions of files and clusters in a delete log which is stored in a storage device, and logging of deletions occurs when requested [col. 6, line 63 to col. 7, line 10].

It would have been obvious to one having ordinary skill in the art at the time the invention was made to further include Shorrof's teaching, as mentioned above, into Shah file system. Doing so would allow the file system to utilize the deletion log to free up additional space for the OFS file system when the OFS file is in shortage of memory space, thus increases the memory space [col. 6, line 63 to col. 7 line 10].

**Per claim 54,** Shah does not teach delete log is used to recover from a crash or other abnormal functioning.

Shoroff teaches delete log is used to recover from a crash or other abnormal functioning [col. 6, line 63 to col. 7, line 10].

It would have been obvious to one having ordinary skill in the art at the time the invention was made to further include Shorrof's teaching, as mentioned above, into Shah file system. Doing so would increase the system reliability, since the deleted files are still maintained in the deletion log, if an error occurs during file copying, then the deleted file can be retrieved from the deletion log [col. 5, lines 48-55].

*Allowable Subject Matter*

7.  Claims 23-26, 29-47, 49-50, 52-53, 55 are objected to as being dependent upon a rejected
base claim, but would be allowable if rewritten in independent form including all of the
limitations of the base claim and any intervening claims.

*Conclusion*

8.  The prior art made of record and not relied upon is considered pertinent to applicant's
disclosure.

a)  Morris PN 5,813,017 discloses Cachcing in client/server environment.

b)  Chen et al PN 6,389,510 discloses Caching web-based information.
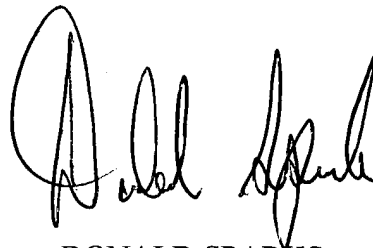
9.  Any inquiry concerning this communication or earlier communications from the examiner
should be directed to Ngoc Dinh whose telephone number is (703) 305-3023.  The examiner can
normally be reached on Monday-Friday 8:30 AM-5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor,
Donald A. Sparks, can be reached on (703) 308-1756. The fax phone numbers for the
organization where this application or proceeding is assigned are (703) 746-7239 for regular
communications and (703) 746-7238 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should
be directed to the receptionist whose telephone number is (703) 305-3900.

NGOC DINH                                                DONALD SPARKS
Patent Examiner                                          Supervisory Patent Examiner
ART UNIT 2187                                            Technology Center 2100
June 10, 2004